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(56) Documents Cited

EP 1137099 A2

EP 0847099 A1

US 6300913 B1

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UK CL (Edition V) H1Q

INT CL⁷ H01Q

Other: **ONLINE DATABASE: EPODOC, JAPIO, WPI**

(54) Abstract Title

Antenna installation structure

(57) For use with an antenna unit included in an antenna built-in type information terminal, the present invention provides an antenna unit structure that makes it possible to hold and assemble an antenna unit and to disassemble an antenna unit. The antenna unit 1 structure comprises a coiled spring 6 and a pin terminal 5 that is moved by the elasticity of the coiled spring 6 included in a power feeder 4. The antenna unit 1 is fixed by latch hooks 2 provided on the antenna unit 1 and by a fixing pawl 9, a plurality of vibration preventing ribs 10, and a concave portion 11 in an antenna installation part 8 provided in a main body 7.

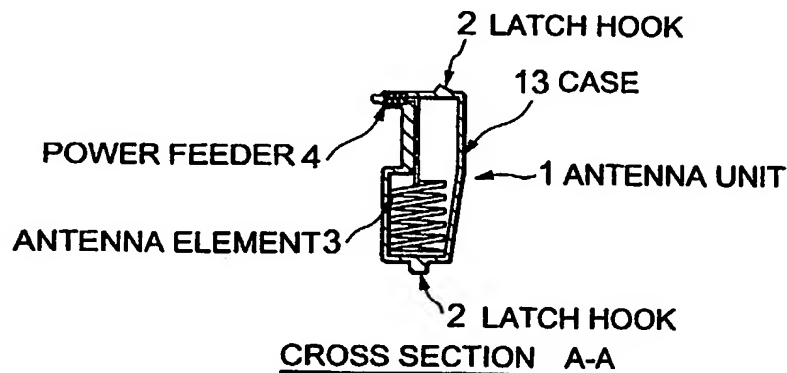


Fig. 2

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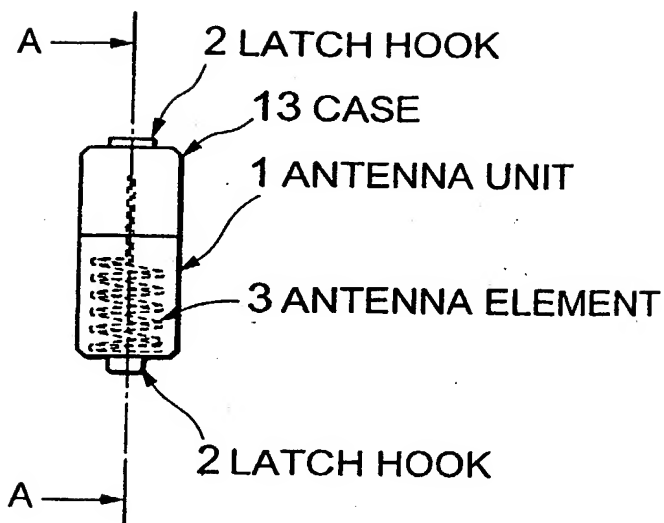


Fig. 1

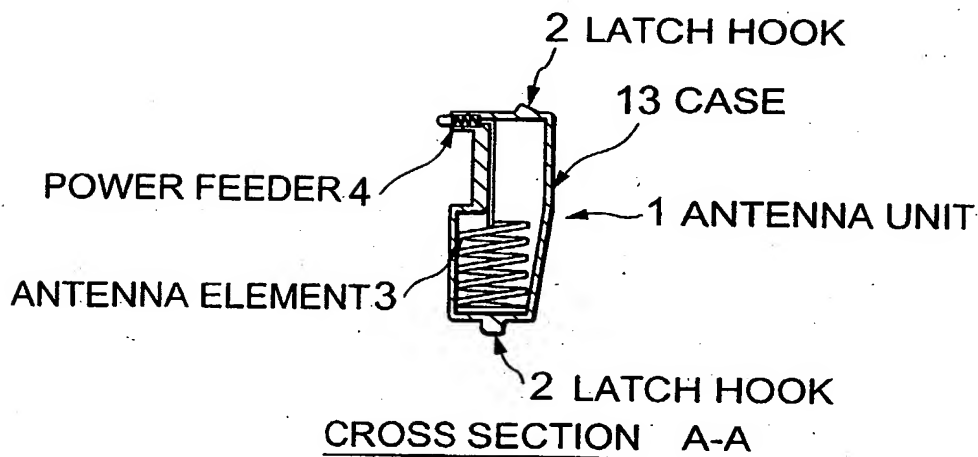


Fig. 2

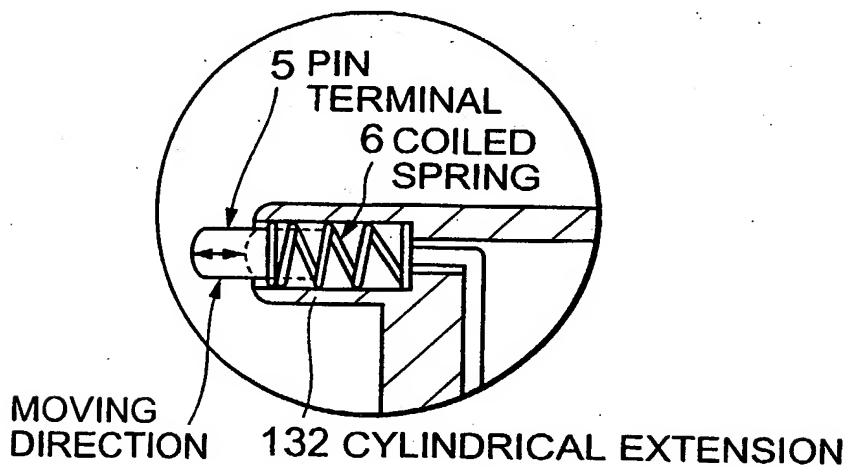


Fig. 3

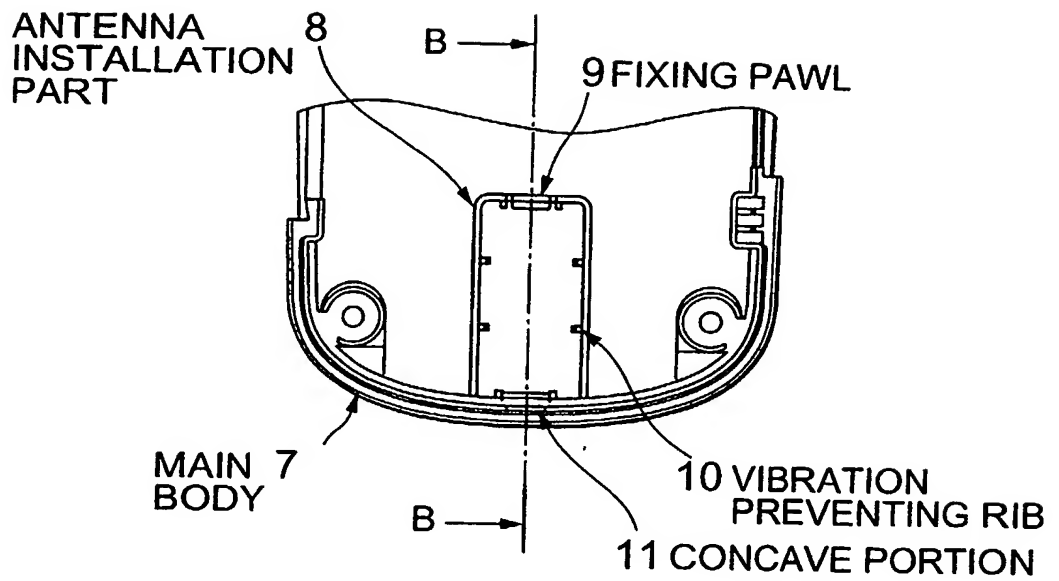
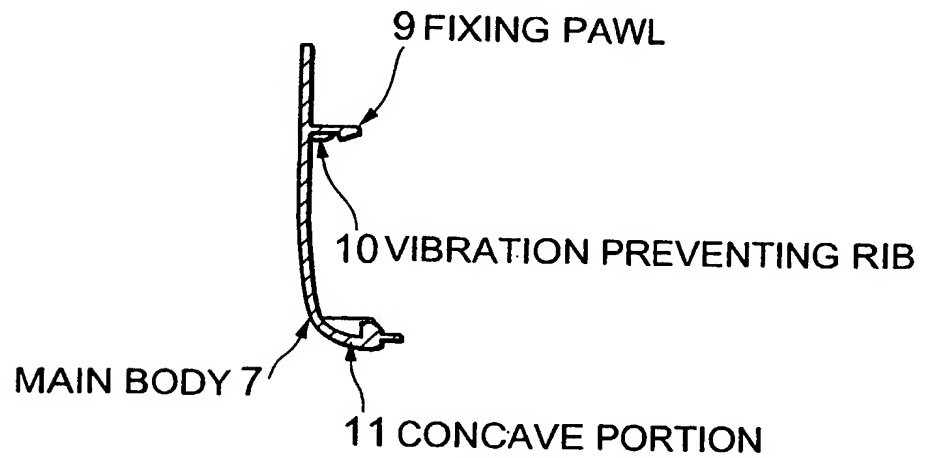


Fig. 4



CROSS SECTION B-B

Fig. 5

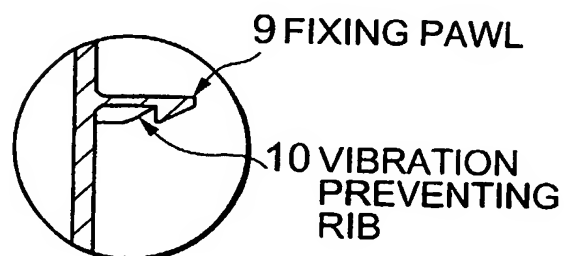


Fig. 6

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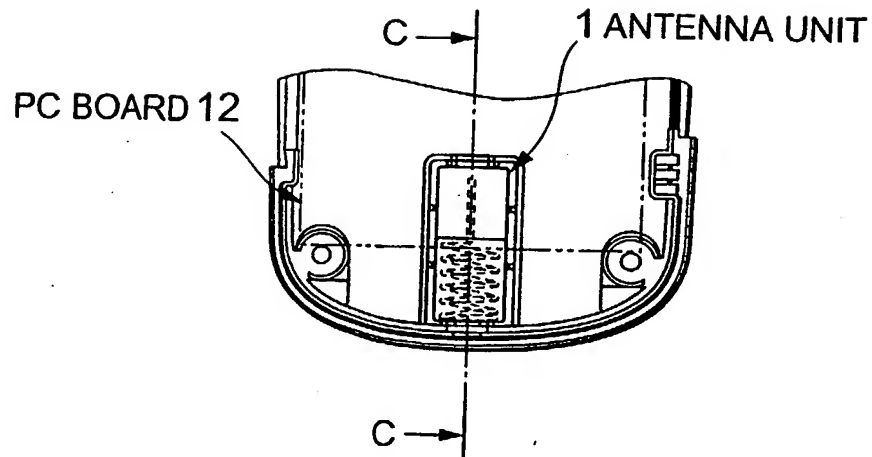
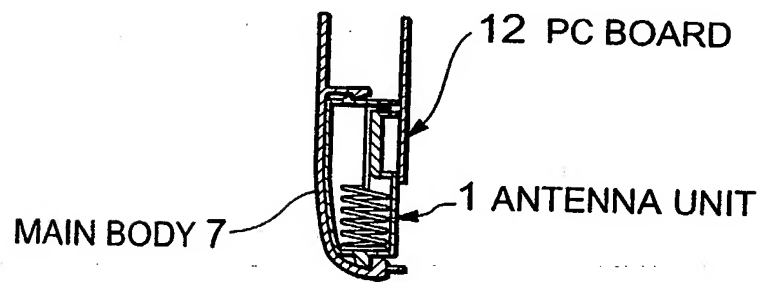


Fig. 7



CROSS SECTION C-C

Fig. 8

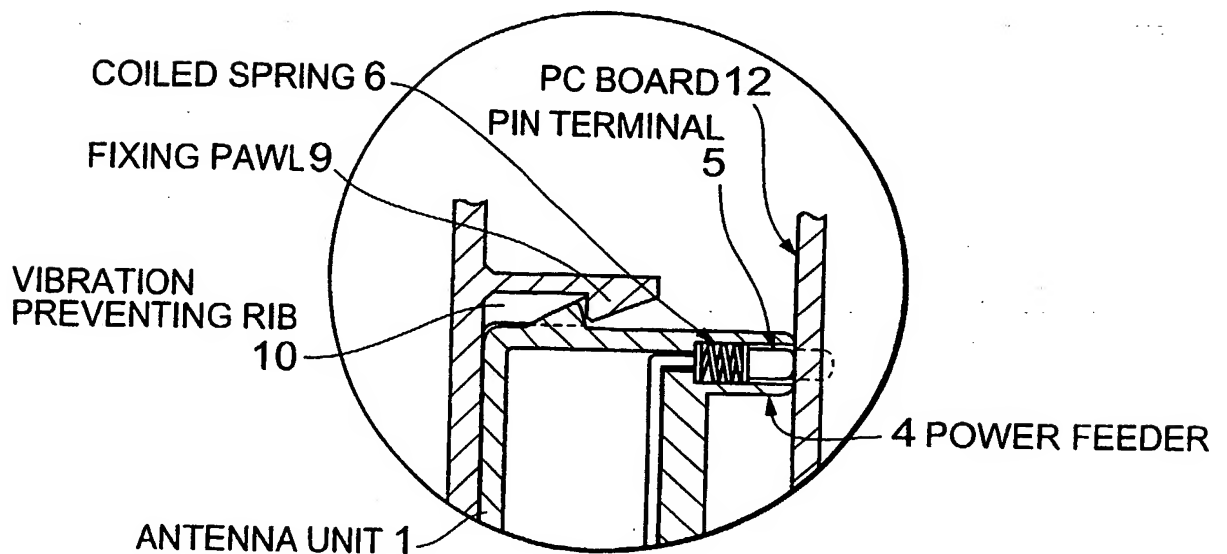


Fig. 9

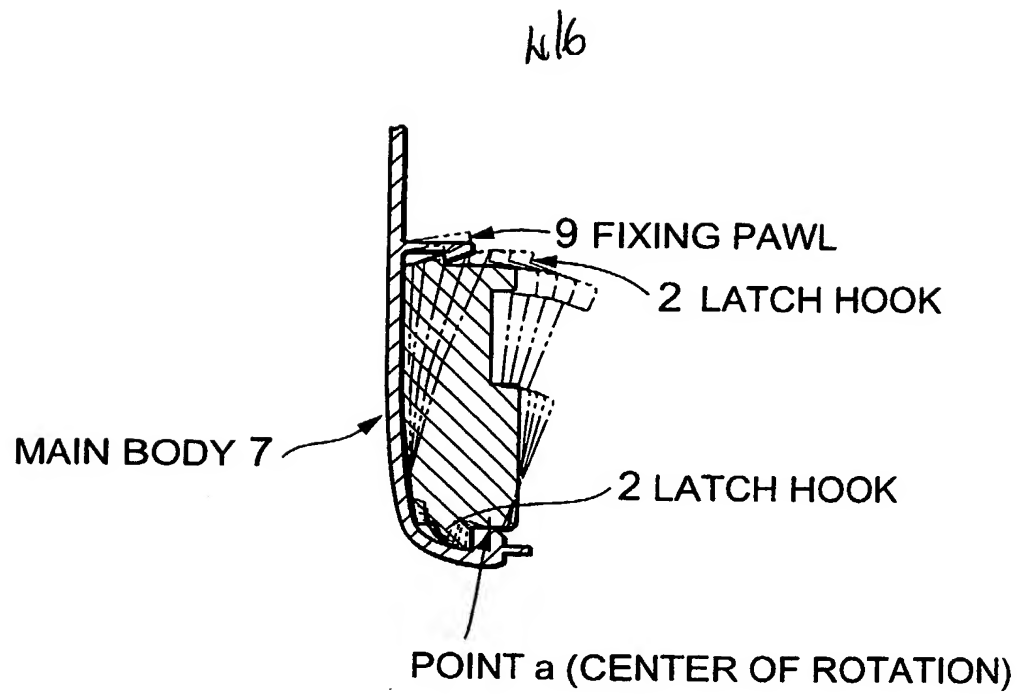


Fig. 10

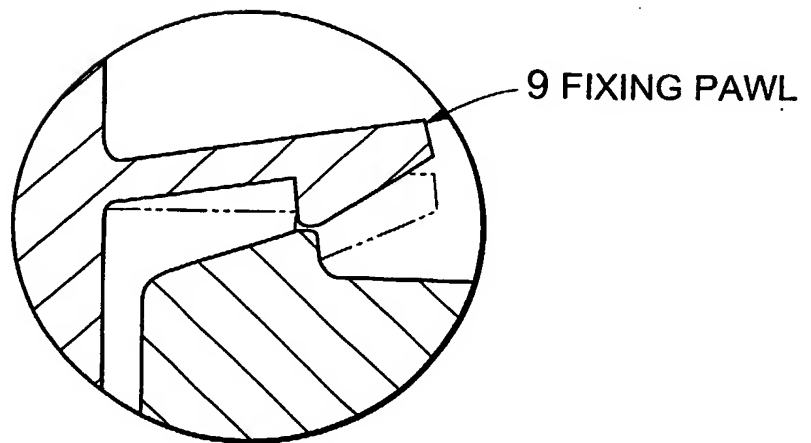


Fig. 11

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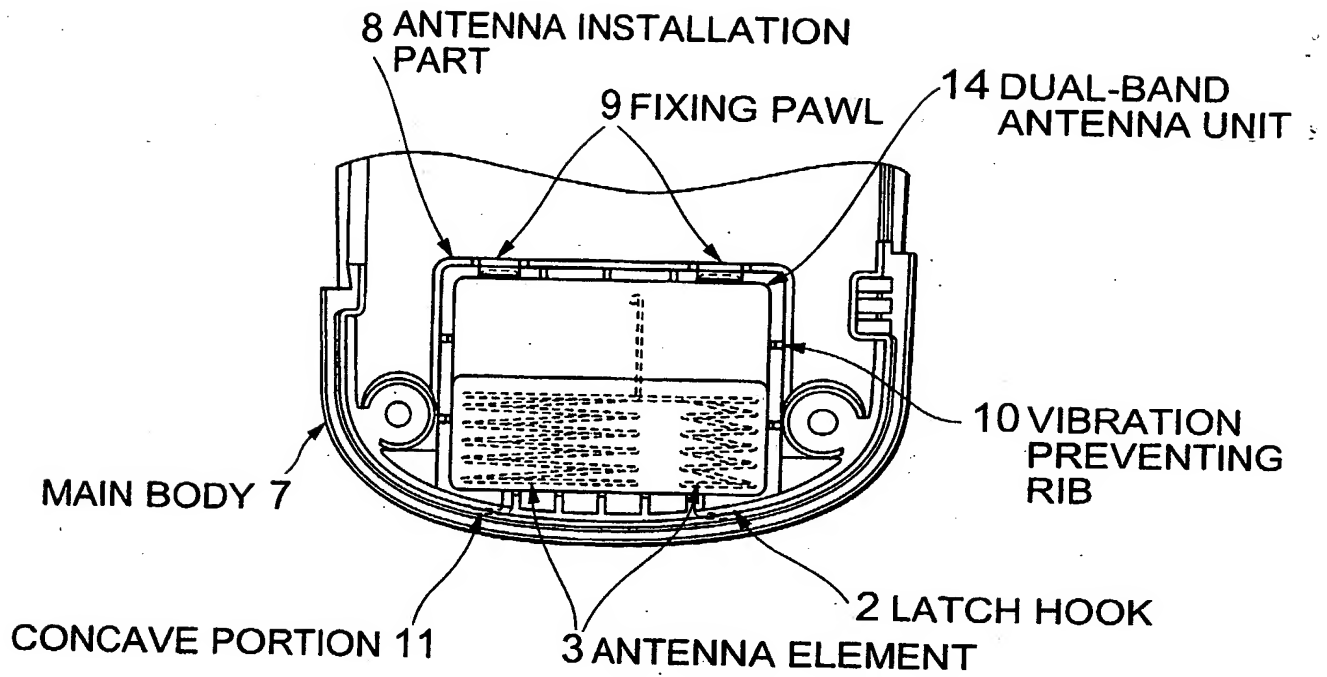


Fig. 12

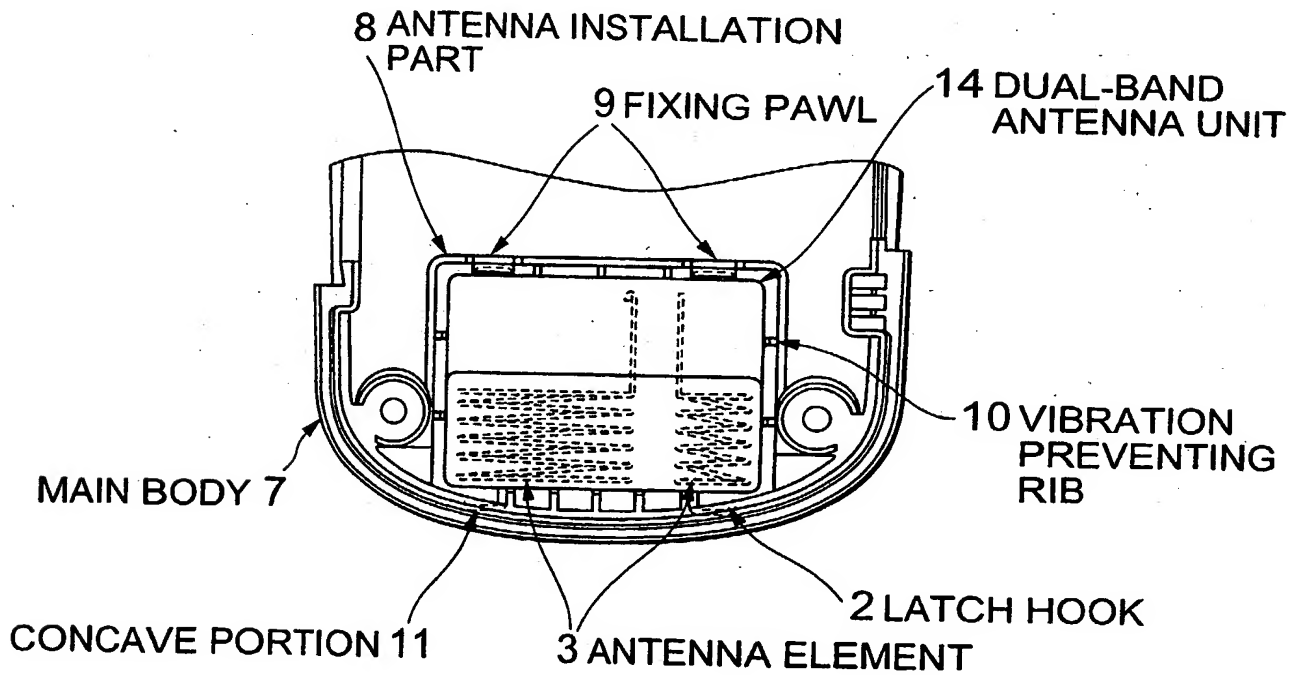


Fig. 13

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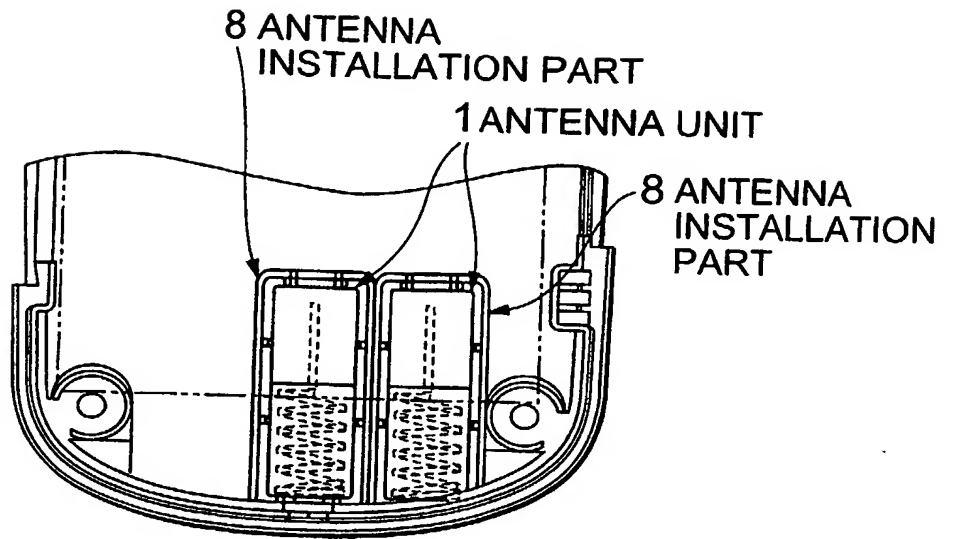


Fig. 14

ANTENNA INSTALLATION STRUCTURE AND INFORMATION TERMINAL HAVING
AN ANTENNA

BACKGROUND OF THE INVENTION

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The present invention relates to an antenna installation structure of an information terminal, and more particularly to an installation structure of an antenna of an antenna built-in type information terminal.

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Conventionally, a cellular phone is an example of an antenna built-in type information terminal. Some cellular phones, which are of a folding type, have an antenna in the antenna-holding part of the main body for sending and receiving radio waves.

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Some conventional cellular phones have an antenna built in the main body. This built-in antenna is installed in the main body by soldering a straight built-in antenna or a coiled built-in antenna directly on the board or by fixing a plate-like antenna in the fixing position within the main body with a double-faced tape.

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The problem with those antenna installation structures is that they require much installation labor and therefore long working hours.

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SUMMARY OF THE INVENTION

It is an object of the present invention to provide an

antenna installation structure, which makes it easy to hold or
5 assemble an antenna and to disassemble an antenna, and an
information terminal that has the antenna.

In a first aspect the present invention provides an
antenna mounting system comprising:

an antenna unit comprising an antenna element and a
10 feeder; and

means for releasably receiving said antenna unit.

The antenna installation structure according to a preferred
embodiment has an antenna unit including an antenna element
and a power feeder; and an antenna installation part in which
15 the antenna unit can be removably installed. The power feeder
comprises a terminal moved by an elastic member. The antenna
unit installation part is provided with end fixing means for
fixing axial-direction ends of the antenna unit and vibration
preventing means for preventing the antenna unit from
20 vibrating in order to secure the antenna unit.

In a second aspect the present invention provides an
information terminal comprising:

means for releasably receiving an antenna unit comprising
an antenna element and a feeder.

25 In a third aspect the present invention provides an
antenna unit comprising a case housing an antenna element and
a feeder.

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BRIEF DESCRIPTION OF THE DRAWINGS.

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The above and other objects, features and advantages of the present invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings wherein:

10 Fig. 1 is a plan view showing an antenna unit in a first embodiment;

Fig. 2 is a cross sectional view taken on line A-A of the antenna unit in Fig. 1;

15 Fig. 3 is an enlarged view of a power feeder inside the antenna unit in the first embodiment;

Fig. 4 is a plan view showing the detail of a cellular phone's antenna installation part in which the antenna unit is.

20

contained;

Fig. 5 is a cross sectional view taken on B-B of the antenna installation part shown in Fig. 4;

Fig. 6 is a partially enlarged view of Fig. 5;

5 Fig. 7 is a plan view showing the detail of the antenna unit installed in the antenna installation part;

Fig. 8 is a cross sectional view taken on C-C of Fig. 7;

Fig. 9 is a partially enlarged view of Fig. 8;

10 Fig. 10 is a cross sectional view showing how the antenna unit is held in the antenna installation part;

Fig. 11 is a partially enlarged view of Fig. 10;

Fig. 12 is a diagram showing the configuration of a second embodiment;

15 Fig. 13 is a diagram showing the configuration of the second embodiment; and

Fig. 14 is a diagram showing the configuration of the second embodiment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

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Fig. 1 is a plan view showing an antenna unit in a first embodiment of the present invention. Referring to Fig. 1, an antenna unit 1 according to the present invention has a case 13 on which a plurality of latch hooks 2 are formed, and an antenna element 3 contained in the case 13.

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Fig. 2 is a cross sectional view taken on line A-A of the antenna unit 1 shown in Fig. 1, and Fig. 3 is an enlarged cross

sectional view of the power feeder inside the antenna unit 1. A power feeder 4 is composed of a terminal and an elastic member. The power feeder 4 is connected to a board, not shown, by the pressure of the elastic member. More specifically, a pin terminal 5 in a cylindrical extension 132 provided at one end of the case 13 is pressed by a coiled spring 6, which functions as the elastic member, to electrically connect an antenna element to the board. The elastic member may be a leaf spring.

Fig. 4 is a plan view showing the detail of a cellular phone's antenna installation part in which the antenna unit is contained, Fig. 5 is a cross sectional view taken on B-B of the antenna installation part shown in Fig. 4, and Fig. 6 is a partially enlarged view of Fig. 5. The antenna installation part 8 is provided at the bottom and inside a main body 7 of the cellular phone so that it is integrated with the main body. The latch hook 2 in the antenna unit 1 is engaged with a fixing pawl 9 in the antenna installation part 8.

A plurality of vibration preventing ribs 10 are provided in the circumferential portion of the frame of the antenna installation part 8 to secure the antenna unit in the correct position when it is stored. Instead of providing the antenna installation part 8 within the main body 7, the antenna unit may also be secured by a component such as a frame within the cellular phone.

Fig. 7 is a plan view showing the detail of the antenna unit installed in the antenna installation part, Fig. 8 is a cross sectional view taken on C-C of Fig. 7, and Fig. 9 is a

partially enlarged view of Fig. 8.

As shown in Fig. 7, a printed circuit board 12 containing a radio circuit is installed in the main body 7 with the antenna unit is installed. The elasticity of the elastic coil spring 5 6 presses the moving pin terminal 5 against the printed circuit board and thus holds the printed circuit board 12 in contact with the pin terminal 5 to keep the antenna unit 1 electrically connected with the printed circuit board 12.

To seat the antenna unit in the antenna installation part, 10 do the following steps. As shown in Fig. 10, slightly tilt the antenna unit and engage the bottom latch hook 2 with the concave portion of the antenna installation part. Then, push the top latch hook 2 into the antenna installation part 8 while rotating the antenna unit with point a as the center of rotation. At 15 this time, the fixing pawl 9, which is pressed by the inclined face of the latch hook 2, is bent as shown in Fig. 11. After passing over the maximum bending point, the fixing pawl 9 returns to its original position to engage itself with the latch hook 2.

20 Fig. 12 and Fig. 13 are diagrams showing the configuration of a second embodiment of the present invention. The antenna unit according to this invention has a plurality of latch hooks 2 on the case. The unit has two or more antenna elements and power feeders in the case, each corresponding to a frequency 25 band.

Referring to Fig. 14, a plurality of antenna units, each composed of one or more antenna elements and power feeders, are

contained in the antenna installation part and those antenna units are contained in separate cases each with a plurality of latch hooks.

As described above, the antenna unit according to the present invention has a moving pin terminal in the power feeder thereof to connect the antenna unit with the printed circuit board. This makes it possible to easily assemble an antenna without soldering and to easily remove (disassemble) the antenna unit.

Increased accuracy in the shape of the antenna installation part increases the accuracy of the antenna position, thus ensuring the reliable antenna unit position.

Building an antenna unit in a cellular phone eliminates the need for a cylinder-like swell found on a conventional cellular phone that has a telescopic antenna. This reduces cellular phone design limitations.

While this invention has been described in connection with certain preferred embodiments, it is to be understood that the subject matter encompassed by way of this invention is not to be limited to those specific embodiments. On the contrary, it is intended for the subject matter of the invention to include all alternatives, modifications and equivalents as can be included within the scope of the following claims.

Each feature disclosed in this specification (which term
5 includes the claims) and/or shown in the drawings may be
incorporated in the invention independently of other disclosed
and/or illustrated features.

Statements in this specification of the "objects of the
invention" relate to preferred embodiments of the invention,
10 but not necessarily to all embodiments of the invention
falling within the claims.

The description of the invention with reference to the
drawings is by way of example only.

The text of the abstract filed herewith is repeated here
15 as part of the specification.

For use with an antenna unit included in an antenna
built-in type information terminal, the present invention
provides an antenna unit structure that makes it possible to
hold and assemble an antenna unit and to disassemble an antenna
20 unit. The antenna unit structure is that a coiled spring and
a pin terminal that is moved by the elasticity of the coiled
spring is included in a power feeder. The antenna unit is fixed
by latch hooks provided on the antenna unit and by a fixing pawl,
a plurality of vibration preventing ribs, and a concave portion
25 in an antenna installation part provided in a main body.

CLAIMS:

1. An antenna mounting system comprising:
an antenna unit comprising an antenna element and a
5 feeder; and
means for releasably receiving said antenna unit.
2. An antenna mounting system according to Claim 1, wherein
said feeder comprises a movable terminal.
- 10 3. An antenna mounting system according to Claim 2,
comprising resilient means for moving said terminal.
4. An antenna mounting system according to any preceding
15 claim, wherein said antenna unit comprises means for
connecting said antenna unit to said receiving means.
5. An antenna mounting system according to Claim 4, wherein
said connecting means comprises:
20 means for connecting ends of said antenna unit to said
receiving means.
6. An antenna mounting system according to Claim 5,
comprising latch hooks provided on one of said antenna unit
25 and said receiving means and complementary surfaces on the
other of said antenna unit and said receiving means each for
engaging a respective latch hook.
7. An antenna mounting system according to any preceding
30 claim, wherein said receiving means comprises vibration
preventing means for preventing said antenna unit from
vibration when mounted therein.

8. An antenna mounting system according to Claim 7, wherein
5 said vibration preventing means has ribs for preventing said
antenna unit from vibrating.
9. An antenna mounting system according to any preceding
claim, comprising a board, on which an electric circuit is
10 mounted, for electrical connection to said feeder.
10. An antenna mounting system according to any preceding
claim wherein said antenna unit has a plurality of antenna
elements.
- 15 11. An antenna mounting system according to any preceding
claim comprising a plurality of antenna units.
12. An information terminal comprising an antenna mounting
20 system according to any preceding claim.
13. An information terminal according to Claim 12, wherein
said receiving means is provided in a main body of said
information terminal.
- 25 14. An information terminal comprising:
means for releasably receiving an antenna unit comprising
an antenna element and a feeder.
- 30 15. An antenna unit comprising a case housing an antenna
element and a feeder.
16. An antenna mounting system, an information terminal or an
antenna unit substantially as herein described with reference
35 to any of the accompanying drawings.



INVESTOR IN PEOPLE

Applicati n No: GB 0304018.5
Claims searched: All

Examiner: Helen Edwards
Date of search: 24 June 2003

Patents Act 1977 : Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance	
X	1, 4, 5, 6, 9, 10, 12, 13, 14, 15	EP 1137099 A2	(NOKIA) See figures 4, 5, 6 and paragraphs 0020-0024
X	1, 4, 5, 12, 13, 14, 15	EP 0847099 A1	(ICO SERVICES) See figure 1 and abstract
X	1, 4, 5, 6, 10, 11, 12, 13, 14, 15	US 6300913 B1	(NOKIA) See figures 4, 7a, 7b and page 5 lines 9-19
X	1, 4, 5, 15	US 5233363	(RADIO FREQUENCY SYSTEMS) See figure 4 and abstract.

Categories:

X Document indicating lack of novelty or inventive step	A Document indicating technological background and/or state of the art.
Y Document indicating lack of inventive step if combined with one or more other documents of same category.	P Document published on or after the declared priority date but before the filing date of this invention.
& Member of the same patent family	E Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^v:

H1Q

Worldwide search of patent documents classified in the following areas of the IPC⁷:

H01Q

The following online and other databases have been used in the preparation of this search report :

EPODOC, JAPIO, WPI